WHAT IS CLAIMED IS:

1. A method of measuring a physical function, the method comprising:

forming a symmetric composite function by combining the physical function with a reference function;

obtaining a Fourier transform of the symmetric composite function; and

calculating an inverse Fourier transform of the obtained Fourier transform, wherein the calculated inverse Fourier transform provides information regarding the physical function.

2. The method of Claim 1, wherein the physical function is substantially equal to $f(z)$ and the reference function is substantially equal to $-f(-z)$, whereby the symmetric composite function is an odd function.

3. A method of measuring a nonlinearity profile of a sample, the method comprising:

providing a sample having a sample nonlinearity profile;

placing a surface of the sample in proximity to a surface of a supplemental sample to form a composite sample having a composite nonlinearity profile;

measuring a Fourier transform magnitude of the composite nonlinearity profile; and

calculating the sample nonlinearity profile using the Fourier transform magnitude of the composite nonlinearity profile.

4. The method of Claim 3, wherein the sample nonlinearity profile is non-symmetric.

5. The method of Claim 3, wherein the composite nonlinearity profile is symmetric about the origin.

6. A method of measuring a nonlinearity profile of a sample, the method comprising:

providing a sample having at least one sample surface and having a sample nonlinearity profile along a sample line through a predetermined point on the sample surface, the sample line oriented perpendicularly to the sample surface;

measuring a Fourier transform magnitude of the sample nonlinearity profile;

providing a reference material having at least one reference surface and having a reference nonlinearity profile along a reference line through a predetermined point on the reference surface, the reference line oriented perpendicularly to the reference surface;

obtaining a Fourier transform magnitude of the reference nonlinearity profile;

forming a first composite sample having a first composite nonlinearity profile by placing the sample and the reference material proximate to one another in a first configuration with the sample line substantially collinear with the reference line;

measuring a Fourier transform magnitude of the first composite nonlinearity profile;

forming a second composite sample having a second composite nonlinearity profile which is inequivalent to the first composite nonlinearity profile by placing the sample and the reference material proximate to one another in a second configuration with the sample line substantially collinear with the reference line;

measuring a Fourier transform magnitude of the second composite nonlinearity profile; and

calculating the sample nonlinearity profile using the Fourier transform magnitudes of the sample nonlinearity profile, the reference nonlinearity profile, the first composite nonlinearity profile, and the second composite nonlinearity profile.

7. A method of measuring a nonlinearity profile of a sample, the method comprising:

providing a sample having at least one sample surface and having a sample nonlinearity profile along a sample line through a predetermined point on the sample surface, the sample line oriented perpendicularly to the sample surface;

providing a reference material having at least one reference surface and having a reference nonlinearity profile along a reference line through a predetermined point on the reference surface, the reference line oriented perpendicularly to the reference surface;

forming a first composite sample having a first composite nonlinearity profile by placing the sample and the reference material proximate to one another in a first configuration with the sample line substantially collinear with the reference line;

measuring a Fourier transform magnitude of the first composite nonlinearity profile;

forming a second composite sample having a second composite nonlinearity profile which is inequivalent to the first composite nonlinearity profile by placing the sample and the reference material proximate to one another in a second configuration with the sample line substantially collinear with the reference line;

measuring a Fourier transform magnitude of the second composite nonlinearity profile; and

calculating the sample nonlinearity profile using the Fourier transform magnitudes of the first composite nonlinearity profile and the second composite nonlinearity profile.

8. The method of Claim 7, wherein:

the sample has a first sample surface and has a second sample surface substantially parallel to the first sample surface;

the first configuration has the first sample surface proximate to the reference surface; and

the second configuration has the second sample surface proximate to the reference surface.

9. The method of Claim 7, wherein:

the reference material has a first reference surface and has a second reference surface substantially parallel to the first reference surface;

the first configuration has the sample surface proximate to the first reference surface; and

the second configuration has the sample surface proximate to the second reference surface.

10. The method of Claim 7, wherein the sample comprises poled silica.

11. The method of Claim 7, wherein the sample comprises a nonlinear organic material.

12. The method of Claim 7, wherein the sample comprises a nonlinear inorganic material.

13. The method of Claim 12, wherein the sample comprises an amorphous material.

14. The method of Claim 7, wherein the first configuration comprises the sample and the reference material in an anode-to-anode configuration in which an anodic surface of the sample is proximate to an anodic surface of the reference material.

15. The method of Claim 14, wherein the second configuration comprises the sample and the reference material in an anode-to-cathode configuration in which an anodic surface of the sample is proximate to a cathodic surface of the reference material.

16. The method of Claim 14, wherein the second configuration comprises the sample and the reference material in an cathode-to-anode configuration in which a cathodic surface of the sample is proximate to an anodic surface of the reference material.

17. The method of Claim 7, wherein the first configuration comprises the sample and the reference material in a cathode-to-cathode configuration in which a cathodic surface of the sample is proximate to a cathodic surface of the reference material.

18. The method of Claim 17, wherein the second configuration comprises the sample and the reference material in an anode-to-cathode configuration in which an anodic surface of the sample is proximate to a cathodic surface of the reference material.

19. The method of Claim 17, wherein the second configuration comprises the sample and the reference material in an cathode-to-anode configuration in which a cathodic surface of the sample is proximate to an anodic surface of the reference material.

20. The method of Claim 7, wherein the first configuration comprises a spacer material between the sample and the reference material.

21. The method of Claim 7, wherein the second configuration comprises a spacer material between the sample and the reference material.

22. The method of Claim 7, wherein measuring the Fourier transform magnitude of the first composite nonlinearity profile comprises measuring the Maker fringe profile of the first composite sample.

23. The method of Claim 7, wherein measuring the Fourier transform magnitude of the first composite nonlinearity profile comprises focusing a pulsed laser beam onto the first composite sample at an incident angle, generating a second-harmonic signal, and measuring the generated second-harmonic signal as a function of the incident angle.

24. The method of Claim 7, wherein measuring the Fourier transform magnitude of the second composite nonlinearity profile comprises measuring the Maker fringe profile of the second composite sample.

25. The method of Claim 7, wherein measuring the Fourier transform magnitude of the second composite nonlinearity profile comprises focusing a pulsed laser beam onto the second composite sample at an incident angle, generating a second-harmonic signal, and measuring the generated second-harmonic signal as a function of the incident angle.

26. The method of Claim 7, further comprising calculating the reference nonlinearity profile using the Fourier transform magnitudes of the first composite nonlinearity profile and the second composite nonlinearity profile.

27. A method of measuring nonlinearity profiles of a plurality of samples, the method comprising:

(a) measuring a first nonlinearity profile of a first sample using the method of Claim 26;

(b) measuring a second nonlinearity profile of a second sample using the method of Claim 26, wherein the same reference material is used to measure the first and second nonlinearity profiles; and

comparing the calculated reference nonlinearity profiles from (a) and (b) to provide an indication of the consistency of the measurements of the first and second nonlinearity profiles.

28. A method of measuring a sample temporal waveform of a sample optical pulse, the method comprising:

providing a sample optical pulse having a sample temporal waveform;

measuring a Fourier transform magnitude of the sample temporal waveform;

providing a reference optical pulse having a reference temporal waveform;

obtaining a Fourier transform magnitude of the reference temporal waveform;

forming a first composite optical pulse comprising the sample optical pulse followed by the reference optical pulse, the first composite optical pulse having a first composite temporal waveform;

measuring a Fourier transform magnitude of the first composite temporal waveform;

providing a time-reversed pulse having a time-reversed temporal waveform corresponding to the reference temporal waveform after being time-reversed;

forming a second composite optical pulse comprising the sample optical pulse followed by the time-reversed optical pulse;

measuring a Fourier transform magnitude of the second composite temporal waveform; and

calculating the sample temporal waveform using the Fourier transform magnitude of the sample temporal waveform, the Fourier transform magnitude of the reference temporal waveform, the Fourier transform magnitude of the first composite temporal waveform, and the Fourier transform magnitude of the second composite temporal waveform.

29. The method of Claim 28, wherein the time-reversed optical pulse is provided using four-wave mixing.

30. The method of Claim 28, wherein the time-reversed optical pulse is provided using spectral holography.

31. The method of Claim 28, wherein the reference optical pulse is broader than the sample optical pulse.

32. The method of Claim 31, wherein the time-reversed optical pulse is provided using the sample optical pulse to time-reverse the reference optical pulse.

33. The method of Claim 31, wherein the sample optical pulse has a temporal width on the order of femtoseconds and the reference optical pulse has a temporal width on the order of nanoseconds.

34. The method of Claim 28, wherein the first composite optical pulse includes a time delay between the sample optical pulse and the reference optical pulse.

35. The method of Claim 28, wherein the second composite optical pulse includes a time delay between the sample optical pulse and the time-reversed pulse.

36. The method of Claim 28, further comprising calculating the reference temporal waveform using the Fourier transform magnitudes of the sample temporal waveform, the reference temporal waveform, the first composite temporal waveform, and the second composite temporal waveform.

37. A method of measuring temporal waveforms of a plurality of optical pulses, the method comprising:

(a) measuring a first temporal waveform of a first optical pulse using the method of Claim 28;

(b) measuring a second temporal waveform of a second optical pulse using the method of Claim 28, wherein the same reference optical pulse is used to measure the first and second temporal profiles; and

comparing the calculated reference temporal waveforms from (a) and (b) to provide an indication of the consistency of the measurements of the first and second temporal profiles.

38. A method of measuring a sample temporal waveform of a sample optical pulse, the method comprising:

providing a sample optical pulse having a sample temporal waveform;

providing a reference optical pulse having a reference temporal waveform;

forming a composite optical pulse comprising the sample optical pulse followed by the reference optical pulse with a relative delay between the sample pulse waveform and the reference pulse waveform;

measuring a Fourier transform magnitude squared of the composite optical pulse;

calculating an inverse Fourier transform of the measured Fourier transform magnitude squared; and

calculating the sample temporal waveform using the calculated inverse Fourier transform.